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EXAMINER

GRAYBILL, DAVID E

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 12/26/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/785,194

Applicant(s)

SHINJI TAKEDA

Examiner

David E Graybill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 25-65 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 25-65 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☒ Certified copies of the priority documents have been received in Application No. 08/981,702.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,5,7-9 6) ☐ Other: \_\_\_\_\_

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 25-30, 33, 36, 48, 49, 52, 55, 58-60 and 63-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita (5406124).

At column 3, line 63 to column 4, line 35; column 7, lines 6-9; column 8, lines 1-8 and 24-47; column 9, lines 14-35;

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column 10, lines 14-15; column 14, lines 3-14 and 40-46; column 16, lines 18-34; column 17, lines 13-14; and column 18, lines 1-10 and 29-30, Morita teaches the following:

25. A process for fabricating a semiconductor device, comprising the step of: bonding a semiconductor device 1 to a support 2 with an organic die-bonding film 4 at conditions of temperature of 100-250°C and pressure of 0.1-30 gf/mm<sup>2</sup> to produce a bonded chip wherein the organic die-bonding film has a peel strength.

26. A process according to 25, further comprising the step of: encapsulating 3 the bonded chip to produce the semiconductor device.

27. A process according to 25, wherein said step of bonding comprises bonding with an organic die-bonding film having a modulus of elasticity of 10 Mpa or less at a temperature of 250°C.

28. A process according to 27, wherein said step of bonding comprises bonding with an organic die-bonding film further having a water absorption of 1.5% by volume or less.

29. A process according to 28, wherein said step of bonding comprises bonding with an organic die-bonding film further having a residual volatile component in an amount of not more than 3.0% by weight.

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30. A process according to 29, wherein said step of bonding comprises bonding with an organic die-bonding film further having a saturation moisture absorption of 1.0% by volume or less.

33. A process according to 25, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

36. A process according to 25, wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

48. A process according to 36, wherein the polyimide is a polyimide synthesized from a combination which is selected from the group consisting of a combination of 1,2-(ethylene)bis(trimellitate anhydride) and bis(4-amino-3,5dimethylphenyl)methane; a combination of 1,2-(ethylene)bis(trimellitate anhydride) and 4,4'-diaminodiphenylether; a combination of 1,2-(ethylene)bis(trimellitate anhydride) and bis(4-amino-3,5-diisopropylphenyl)methane; a combination of 1,2-(ethylene)bis(trimellitate anhydride) and 2,2-bis[4-(4-aminophenoxy)phenyl] propane; a combination of a mixture of 1,2-(ethylene)bis(trimellitate anhydride) and 1,10(decamethylene)bis(trimellitate anhydride) being the same

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mol as the mixture and 2,2bis[4-(4-aminophenoxy)phenyl] propane;  
and a combination of 1,10(decamethylene)bis(trimellitate  
anhydride) and 2,2-bis[4-(4-aminophenoxy)phenyl] propane.

49. A process according to 25, wherein said step of bonding is  
carried out with a bonding time of from 0.1 seconds (inclusive)  
to 2 seconds.

52. A process according to 25, wherein said step of bonding is  
carried out with a bonding time of from 0.1 seconds (inclusive)  
to 1.5 seconds.

55. A process according to 25, wherein said step of bonding is  
carried out at a pressure of 0.1-4 gf/mm<sup>2</sup>.

58. A process according to 49, wherein said step of bonding is  
carried out at a pressure of 0.1-4 gf/mm<sup>2</sup>.

59. A process according to 52, wherein said step of bonding is  
carried out at a pressure of 0.1-4 gf/mm<sup>2</sup>.

60. A process according to 25, wherein said step of bonding is  
carried out at a pressure of 0.3-2 gf/mm<sup>2</sup>.

63. A process according to 49, wherein said step of bonding is  
carried out at a pressure of 0.3-2 gf/mm<sup>2</sup>.

64. A process according to 52, wherein said step of bonding is  
carried out at a pressure of 0.3-2 gf/mm<sup>2</sup>.

65. A semiconductor device made by the process of 25.

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Although Morita teaches a material at a stage where a semiconductor has been bonded to a support member using the material, Morita does not appear to explicitly teach that the material has a peel strength of 0.5 kgf/5 mm x 5 mm chip or higher at the stage.

Furthermore, it cannot be determined if the teaching of Morita of a 90 degree peel strength of 67g/10mm<sup>2</sup> chip is equivalent to the instant disclosure of a 17 degree peel strength of 0.5 Kgf/5 x 5 mm chip or above because the conversion factor between the two different peel strength measuring techniques is unknown. Nonetheless, as cited, Morita teaches that an increase in peel strength is desirable, and it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed peel strength range because applicant has not disclosed that the range is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the product and process would possess utility using another range. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious

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purpose, produce an unexpected result, or are otherwise critical.

In the interest of compact prosecution, applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that is reasonably necessary to the examination of this application.

In response to this requirement, please state the specific improvements of the subject matter in claim 30, specifically, the limitation, "a peel strength of 0.5 Kgf/5 x 5 mm chip or higher" over the disclosed teaching of Morita of a 90 degree peel strength of 67g/10mm<sup>2</sup>, and indicate the specific elements in the claimed subject matter that provide those improvements.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained will be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.



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Claims 31, 32, 34, 35, 37, 38, 50, 51, 53, 54, 56, 57, 61 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 25-30, 33, 36, 48, 49, 52, 55, 58-60 and 63-65, and further in combination with Hozoji (JP5-218107).

Morita does not appear to explicitly teach the following:

31. A process according to 30, wherein said step of bonding comprises bonding with an organic die-bonding film further having a void volume of 10% or less in terms of voids present in the material and at an interface between said film and said support at a stage where the semiconductor has been bonded to the support member by the film.

Nonetheless, in the English abstract and Table 1, Hozoji teaches wherein a step of bonding comprises bonding with an organic die-bonding film further having a void volume of 10% or less in terms of voids present in the material and at an interface between said film and said support at a stage where the semiconductor has been bonded to the support member by the film. Moreover, it would have been obvious to combine the process of Hozoji with the process of Morita because it would facilitate adhesion.

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To further clarify the teaching of a void volume of 10% or less, it is noted that Hozoji teaches that a defect such as a void, etc., is eliminated.

In addition, in the combination, Morita teaches the following:

32. A process according to 31, further comprising the step of: encapsulating the bonded chip to produce the semiconductor device.

34. A process according to 31, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

35. A process according to 32, wherein said die-bonding material is a film comprising one or more resins selected from the group consisting of silicone resin, acrylic resin, polyimide resin and epoxy resin.

37. A process according to 31, wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

38. A process according to 32, , wherein said die-bonding material is a film comprising a polyimide resin and epoxy resin.

50. A process according to 31, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 2 seconds.

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51. A process according to 32, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 2 seconds.

53. A process according to 31, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 1.5 seconds.

54. A process according to 32, wherein said step of bonding is carried out with a bonding time of from 0.1 seconds (inclusive) to 1.5 seconds.

56. A process according to 31, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm<sup>2</sup>.

57. A process according to 32, wherein said step of bonding is carried out at a pressure of 0.1-4 gf/mm<sup>2</sup>.

61. A process according to 31, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm<sup>2</sup>.

62. A process according to 32, wherein said step of bonding is carried out at a pressure of 0.3-2 gf/mm<sup>2</sup>.

Claims 39, 42 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita as applied to claims 25-30, 33, 36, 48, 49, 52, 55, 58-60 and 63-65, and further in combination with Sakumoto (5277972).

Morita does not appear to explicitly teach the following:

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39. A process according to 25, wherein said die-bonding material is a film comprising an acrylic resin and epoxy resin.

42. A process according to 25, wherein said die-bonding material is a film comprising a silicone resin.

45. A process according to claim 25, wherein said die-bonding material is a film comprising a silicone resin and epoxy resin.

Nevertheless, at column 1, lines 14-17; column 2, lines 11-13, and column 9, lines 26-29, Sakumoto teaches a process wherein a die-bonding material is a film comprising an acrylic resin, an epoxy resin, and a silicone resin. Moreover, it would have been obvious to combine the process of Sakumoto with the process of Morita because it would provide an adhesive material.

Although Sakumoto does not appear to explicitly teach the particular claimed combinations of acrylic and epoxy resin, and silicone and epoxy resin, these combinations would have been an obvious matter of routine observation and experimentation.

Indeed, "It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose . . . . [T]he idea of combining them flows logically from their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted) (Claims to a process of

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preparing a spray - dried detergent by mixing together two conventional spray - dried detergents were held to be prima facie obvious.). See also, In re Crockett, 279 F.2d 274, 126 USPQ 186 (CCPA 1960) (Claims directed to a method and material for treating cast iron using a mixture comprising calcium carbide and magnesium oxide were held unpatentable over prior art disclosures that the aforementioned components individually promote the formation of a nodular structure in cast iron.); and Ex parte Quadranti 25 USPQ2d 1071 (Bd. Pat. App. & Inter. 1992) (Mixture of two known herbicides held prima facie obvious).

Claims 40, 41, 43, 44, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morita and Hozoji as applied to claims 31, 32, 34, 35, 37, 38, 50, 51, 53, 54, 56, 57, 61 and 62, and further in combination with Sakumoto (5277972).

Sakumoto is applied for the same reason it was applied to claims 39, 42 and 45.

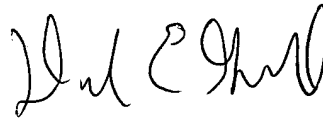
This Office action has an attached requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the attached requirement for information. The time period for reply to the attached requirement coincides with the time period for reply to this Office action.

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***Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to the group receptionist whose telephone number is 703-308-1782.***

Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is 703/305-3431.



David E. Graybill  
Primary Examiner  
Art Unit 2814

D.G.  
17-Dec-01